

## **REMARKS**

The Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

### **I. Status of the Claims**

Claims 2 and 14-22 are requested to be cancelled without prejudice or disclaimers. The Applicants reserve the right to pursue the subject matter in the cancelled claims in a subsequent continuation application. No new matter is introduced, and claims 1 and 3-13 are currently pending to be examined on their merits.

### **II. Claim Objection & 35 U.S.C. §§ 112, 102 Claim Rejections**

Claim 2 is objected to as being of an improper dependent form. Claims 14-22 are rejected under 35 U.S.C. § 112, ¶ 2, as allegedly indefinite. Claims 14-22 are further rejected under 35 U.S.C. § 102(b) as allegedly anticipated by US 7,258,941 (“Hirano”) and US 2005/0069780 (“Kinouchi”). While not necessarily agreeing with the Office, at least in view of the cancellation of these claims, the Applicants respectfully submit that the objection and rejections are moot.

### **III. 35 U.S.C. § 103 Claim Rejections**

Claims 1-13 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kinouchi and Hirano. The Applicants respectfully traverse these rejections.

#### **(i) Current Obviousness Standard**

The U.S. Supreme Court recently reaffirmed the Graham factors for determining obviousness in *KSR Int'l Co. v. Teleflex Inc.* (No. 04-1350) (U.S., April 30, 2007). The Graham factors, as outlined by the Supreme Court in *Graham et al. v. John Deere Co. of Kansas City et al.*, 383 U.S. 1 (1966), are: 1) determining the scope and contents of the prior art; 2) ascertaining the differences between the claimed invention and the prior art; 3) resolving the level of ordinary skill in the pertinent art; and 4) evaluating evidence of secondary consideration. The Supreme

Court recognized that a showing of "teaching, suggestion, or motivation" to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 U.S.C. § 103(a) and held that the proper inquiry for determining obviousness is whether the improvement is more than the predictable use of prior art elements according to their established functions. The Court noted that it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed and specifically stated:

Often, it will be necessary . . . to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason to combine the known elements in the fashion claimed* by the patent at issue. To facilitate review, this analysis should be made explicit.

*KSR Int'l Co. v. Teleflex Inc.*, slip op. at 14 (emphasis added). As discussed below, the cited art cannot render the claimed invention obvious.

(ii) *The present claims are non-obvious over the teachings of Kinouchi and Hirano*

The teachings of Kinouchi and Hirano do not render the present claims obvious, particularly in view of the unexpected and desirable properties with respect to proton conductivity possessed by the presently claimed copolymers.

The Office asserts that because Kinouchi generally teaches that the weight fraction of the acid-group-containing segment falls within the range of 0.05 to 0.95, it would have been obvious to one of ordinary skill in the art to prepare a block copolymer having the presently claimed weight composition ratio. Office Action, page 5. The Applicants respectfully disagree and respectfully submit that even in light of the teaching of Kinouchi or Hirano, one of ordinary skill in the art would not reach a copolymer with the surprisingly high proton conductivity of the presently claimed copolymers. In fact, based on the common understanding in the art, optimization of parameters to increase proton conductivity is normally accomplished by increasing the amount of the segment having an acid group in a copolymer, as evidenced in the

higher amount disclosed in the working examples of Kinouchi and in the disclosure of Hirano. See, further, explanation provided in the Office Action reply dated November 16, 2008. In contrast, these results are attained with a lower amount in the presently claimed copolymers.

At the outset, the Applicants respectfully submit that the proton conductivity of the polymer of Kinouchi is measured in a vacuum-dried condition (see ¶ [0201], Kinouchi). By contrast, the proton conductivity of the presently claimed copolymers is measured at a 90% relative humidity. See ¶ [0080] of the presently published Specification. Thus, it would appear that only an indirect comparison between the proton conductivity of the block copolymers of Kinouchi and that of the presently claimed copolymers can be made. However, a direct comparison can be made via the teaching of Hirano. The proton conductivity disclosed in Hirano is measured under similar conditions to those in the present Specification. Namely, the proton conductivity is measured at a 90% relative humidity in both Hirano and the present Specification.

Hirano also discloses copolymers that are prepared by using the same ingredients and employing the same procedures for producing the polyether sulfone block copolymers as described in Kinouchi; note that their temperatures are slightly different from each other due to the small difference in the amounts of the ingredients used. Accordingly, despite the small differences (e.g., in the weight fraction of the segment of the block copolymers), one can infer that the block copolymers prepared in Synthesis Examples 3, 4, and 5 of Kinouchi have the same chemical structures as those disclosed in Example 2, Comparative Example 3, and Example 3, respectively, of Hirano. Thus, one can infer that the proton conductivity of the copolymer described in each of the examples of Hirano is comparable to that in the respective examples of Kinouchi.

The unexpectedly high proton conductivity of the presently claimed copolymer, despite its lower weight fraction of the acid-containing segment, is evident when the presently claimed copolymers are compared to those of Hirano and Kinouchi. For example, the block copolymer described in Example 2 of Hirano (with an ion exchange capacity of 1.51 meq/g and a hydrophobic segment weight fraction of 0.43) is comparable to that of Synthesis Example 3 of

Kinouchi (with an ion exchange capacity of 1.63 meq/g and a hydrophobic segment weight fraction of 0.45), as described above. The block copolymer of Example 2 of Hirano has a proton conductivity of  $5.1 \times 10^{-2}$  S/cm (see Table 1). By contrast, the proton conductivity of the block copolymer as described in Example 2 of the Specification (with an ion exchange capacity of 1.51 meq/g and a hydrophobic segment weight fraction of 0.27) is  $1.11 \times 10^{-1}$  S/cm, which is more than two fold that of the copolymer of Hirano. Such a high proton conductivity would not have been expected by one of ordinary skill in the art, particularly in view of the low hydrophobic acid-containing segment weight fraction of the presently claimed copolymers.

Thus, despite the small acid-group-containing segment weight fraction, the unexpectedly high proton conductivity of the presently copolymers rebuts any *prima facie* case of obviousness.

Therefore, at least in view of the foregoing, the Applicants respectfully request that the rejections be withdrawn.

**CONCLUSION**

The Applicants believe that the present application is now in condition for allowance and respectfully request favorable reconsideration of the application.

The Office is invited to contact the undersigned by telephone if a telephone interview would advance the prosecution of the present application.

The Office is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, the Applicants hereby petition for such extension under 37 C.F.R. § 1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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